CONSUMER PERCEPTIONS OF FREE-RANGE LAYING HEN WELFARE

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Structured abstract

Purpose

To understand which factors and resources free-range egg consumers believe are important for hen welfare.

Design/methodology/approach

An online survey was distributed via the mailing list of a UK free-range egg brand receiving 6,378 responses. The survey was mostly five-point Likert-scale based. The same survey was also distributed to a group of animal welfare specialists receiving 34 responses.

Findings

Respondents bought free-range eggs because hens are 'happier' (74.2%) and 'healthier' (69.0%) and because they believed such eggs to taste better (57.9%). They rated all the suggested factors that might contribute to hen welfare as 'important' or 'very important' (on average) but believed outside access and fresh air to be most important. Respondents rated the suitability of resources relating to behavioural needs high ('suitable' or 'very suitable') indoors and shelter as the most suitable outdoors. Consumers differed from welfare specialists in their views on factors contributing to hen welfare, but their views on resource suitability were similar.

Research limitations/implications

The sample was biased towards free-range egg consumers who had expressed an interest in a brand marketed as high welfare.

Originality/value

This is the first study to ask consumers what they consider to be important for hen welfare and how they think hen welfare can be improved. Because consumers can affect on-farm welfare through their purchasing habits assessing the degree of agreement between consumers and animal welfare specialists is important.

Introduction

Free-range eggs account for almost half (43% in 2014) of egg production in the UK (DEFRA, 2015). Studies report that consumers generally consider animal welfare to be important (e.g. Bennett, 1996; Vanhonacker et al., 2010) and claim to be willing to pay more for products that are welfare-friendly (Bennett, 1996; Bennett et al., 2016; Eurobarometer, 2005; Vanhonacker et al. 2010). However, despite this, many consumers do not actually buy higher-welfare products. This has been called the 'consumer attitude-behaviour gap' (Carrington et al., 2010; Verbeke, 2009) or 'citizen-consumer duality' and results from 'ambivalent' feelings (Te Velde et al., 2002). In reality there are a number of other factors that may influence purchasing behaviour such as availability, cost, taste and appearance, and high animal welfare may be traded off against these factors (Verbeke, 2009). High welfare brands or free-range products are often more expensive, and so rely on consumers making a choice based on their perceptions that the product is worth paying more for.

Harper and Henson (2001) describe several obstacles that hinder consumers when translating attitudes into purchasing behaviour: "lack of information about production methods, lack of availability of products, lack of belief in the ability of individual consumers to make a difference to animal welfare standards, disassociating the product from the animal of origin, and the increased cost of 'animal-friendly' products". With the exception of availability and cost, these reasons are based on the consumers' understanding or beliefs. It is therefore important to explore these beliefs if the purchase of high welfare products is to develop further.

A perceived lack of information about farm animal welfare has been observed in many studies. One survey of Flemish consumers found that 52.9% considered the current level of welfare-related information to be insufficient (Vanhonacker et al., 2010). Eurobarometer (2005), a large scale study of citizens across the EU, found that almost 90% of people felt that they received insufficient information about farm animal welfare. Harper and Henson (2001) report that consumers want more information about how their food is produced but also partake in 'voluntary ignorance' where they avoid the available information as they don't want to feel responsible for the welfare of the animals they eat or of those whose products they consume. Te Velde et al. (2002) also discusses this concept, both in relation to farmers and to the consumer arguing that consumers do not like to consider problems (such as poor welfare) if they do not have a solution for it. Additionally, many consumers exhibit a lack of trust when learning about animal welfare, particularly from the government, food industry or supermarkets (Harper and Henson, 2001; Vanhonacker et al., 2010).

Dissociation and ignorance also affect consumer attitude-behaviour (Harper and Henson 2001). Most consumers are isolated from the production of animal products and some therefore start to dissociate the food on the supermarket shelf with the animal that produced it. When consumers do think about farming and welfare, many appear to be influenced by anthropomorphic notions (McInerney, 2004)

and an idyllic image of the countryside (Vanhonacker et al., 2010): both concepts somewhat incompatible with large scale food production (McInerney, 2004).

Despite consumers' apparent lack of knowledge, scientific information about the factors that influence animal welfare continues to grow. Welfare depends on both good physical health and the satisfaction of behavioural needs. Good health is undeniably important to prevent suffering and to ensure the animal is well enough to reap any behavioural benefits. The ability of the animal to lead a 'natural' life (Fraser, 2003) ties in with behavioural needs and may play an important role in the eyes of the consumer. The behavioural needs of laying hens have been particularly well-studied and include foraging, dustbathing, nesting and perching at night (Weeks and Nicol, 2006). In a commercial house, providing opportunities to perform these behaviours will improve the welfare of the birds. The effects of resource provision on the welfare of laying hens have also been studied in detail (see Jones, 2004 for a review), mostly looking at pecking devices that can prevent the serious welfare issue of feather pecking. Such resource provision is now a requirement under the RSPCA Assured (RSPCA, 2013) scheme and a recommendation in the Lion Code (BEIC, 2013). However, it remains unclear whether consumers are aware of the real welfare needs of hens and the appropriate resources that can be provided to meet these needs. If consumers are to be encouraged to buy high welfare products they need to perceive that the animals producing the products have received a good quality of life and they need to make some judgement about whether the resources provided for the animals are appropriate. It is therefore valuable to understand what the consumer thinks and how closely this matches specialist opinion.

Aims and Objectives

This study was designed to gain an understanding of what consumers believe to be important for hen welfare, specifically concerning management, resources, and access to the range. A second aim was to establish the extent to which the choices of consumers reflect current scientific opinion. Specifically the study aimed to:

1. Establish which factors consumers believe to be important for hen welfare.
2. Understand how consumers think hen welfare could be improved through provision of resources in a farm setting.
3. Examine how the opinions of the consumer sample relate to those of animal welfare specialists.
4. Determine whether gender or egg purchasing behaviour influence consumer opinions.

Methodology

Survey distribution and design

An online survey was designed to explore consumer perceptions of free-range hen welfare. The survey was intended to take no longer than 5-10 minutes to encourage a reasonable response rate. The aim was a response rate of 5% (1500 respondents).

A link to the survey was distributed by a free-range egg brand in the UK to all email addresses on their mailing list of approximately 30,000. This mailing list was built up through previous participation in competitions, and promotions run by the brand so is likely biased towards people with an interest in high welfare products. An incentive to encourage participation was provided whereby respondents could enter their email address at the end of the survey to be entered into a prize draw to win one of three 'goody bags'. The survey was open for a month (starting 01/2015) and a reminder email was sent out one week before the closing date.

The first page of the survey provided some very basic information about commercial free-range hen farms. Animal welfare can be defined in many different ways so a definition was provided at this point: "*...in this context [animal welfare] should encompass all of the factors that can make a chicken 'happy'*".

Survey content

Demographics and egg purchasing:
The first section asked participants for their gender and age group. To understand the egg purchasing behaviour of participants they were asked multiple choice questions on how often they buy eggs and how often they select free-range eggs. Respondents could then select the reasons for buying free-range or non-free range eggs from a predetermined list.

Hen welfare:
The next section of the survey aimed to establish consumer beliefs about the general factors that might influence welfare. To establish consumers' overall perception of free-range commercial production respondents were asked the question: *"From your knowledge of free-range egg production please rate the welfare of free-range hens in general on a scale of 1-10 (where 1=very poor welfare and 10=best possible welfare)".* Following this, respondents were asked questions in two sub-sections where the answers could be rated on five-point Likert scales that ranged from 'unimportant' through 'moderately important' to 'very important'. In the first sub-section, respondents were asked to rate the importance of the following for hen welfare: *'access to perches', 'access to the outside', 'veterinary care', 'overall space allowance', 'access to play equipment'* and *'interaction with people'*. In the second sub-section they were asked to rate the importance of aspects of the outside area with the options *'fresh air', 'access to grass', 'access to trees', increased naturalness', 'access to sunlight'* and *'extra space'*. Additionally respondents were asked to select which of the provided options they considered the most important within each section. These factors were chosen based on the main differences between free-range and other systems as well as terms often used in free-range marketing.

Suitability of resources *to improve hen welfare*:

In the final section the questions were of a similar style with five-point Likert scales but this time looking at respondents' assessment of the suitability of specific resources in promoting good welfare. The respondents were again asked questions in two sub-sections. The first sub-section asked about the suitability of resources inside the building (options: *music, straw bales, pecking blocks, footballs, dustbaths, perches, hanging chimes* and *coloured cones*) and the second sub-section asked the same for outside the building (options: *dustbaths, perches, wildflowers, fallen tree branches* and *shelter*). All of these are optional resources provided for free-range hens in England and Wales. As before, for both sub-sections they were asked to select which of the provided options they would consider the most suitable to sustain or improve welfare. For these questions considering resources photographs were provided of each resource as some of the options were deemed to be difficult to visualise to a person unfamiliar with laying hen husbandry.

Specialist opinion

To see if consumer perception matched that of specialist animal welfare scientists, the same survey was distributed to those working within the area of animal welfare at the University of Bristol. To be considered a specialist for this study respondents had to be a postgraduate student, technician or academic working in the topic of animal welfare.

Statistical analysis

For the questions relating to reasons for purchasing free-range or non-free-range eggs an '*Other*' option was listed. Some respondents used this option incorrectly so to avoid this skewing the results the responses were corrected if needed. For example, some respondents did not select any option except for 'Other' where they then reported the options from the list that they agreed with. In this case, the correct options were selected and 'Other' only left selected if they reported an option not in the original list. Overall, for the question relating to reasons for buying free-range 41 responses were corrected and for the question related to reasons for buying non-free-range 70 responses were corrected.

Respondents were asked to record their age by selecting one of 6 categories. For the purpose of the analysis and to achieve a more even distribution of numbers these categories were combined and reduced down to 4 groups: 15-34, 35-44, 45-54 and 55+.

Data were analysed using SPSS 23. Summary statistics were first calculated for all questions. All data were either ordinal or categorical. Likert style questions were treated as ordinal data. For group comparisons Mann-Whitney U tests, Kruskall-Wallis tests and Chi-Squared tests were used. For post-hoc analysis of chi-squared tests, standardised residuals were studied with a significance level of 0.05 (1.96).

Results

The survey received 6,378 consumer responses over the month long period equating to a 21% response rate.

Demographics and egg purchasing

In the consumer sample 81.4% of respondents were female and 18.6% male. A moderately even spread of age groups responded although the 15-34 group was slightly underrepresented, constituting 16.9% of the total sample. Other age groups responded as follows: 35-44 (23.2%), 45-54 (27.6%), 55+ (32.3%). The majority (58.5%) bought eggs weekly, with some 12.1% buying more often and 22.2% purchasing approximately fortnightly. Only 7.2% of respondents were occasional egg purchasers (less than every 2-3 weeks). Most of the sample reported that when buying eggs they always buy free-range (62.6%) and 26% reported buying free-range most of the time. Conversely, 9.8% and 1.6% buy free-range occasionally and never respectively. The most popular reasons selected for why people bought free-range were "hens are happier" and "hens are healthier" (see figure 1 for breakdown). The most popular reason for not buying free-range was cost (67%) with availability chosen by 43.3% and 'other' listed as a reason for 2.6%.

Two groups were differentiated based on egg purchasing behaviour. The 'buyer' group (88.6%) consisted of those who said they bought free-range eggs 'Always' or 'Most of the time'. The 'non-buyer' group (11.4%) included those who answered with 'Occasionally' or 'Never'. Non-buyers were less likely to be aged 15-34 and more likely to be aged 55+ ($\chi^2(3)=13.346$, $p=0.004$). Men were significantly more likely to be 55+ than women and significantly less likely to be 15-34 or 35-44 ($\chi^2(3)= 114.358$, $p<0.001$.

Hen welfare

When asked to rate the welfare of free-range hens on a scale of 1-10, the mean score given was 8.7 (±1.3, range:1-10). A large proportion of consumers rated welfare as 8 or above on the scale (85.9%).

Access to the outside was considered the most important general factor by the greatest proportion of consumers (56.1%). When considering the outside area, the greatest proportion of respondents (30.5%) rated access to fresh air as the single most important factor, with all except 'access to trees' being frequently prioritised. See table I for a full breakdown of the consumer results for these questions.

Suitability of resources to improve hen welfare

When asked to choose the most suitable resource inside the house the following resources were frequently chosen: straw bales, pecking blocks, dustbaths and perches (figure 2). When asked to choose the most suitable resource outside, 'shelter' was the choice for 62.6% of respondents. See table II for a full breakdown of the consumer results for the suitability of resources questions.

Specialist opinion

Overall, a sample size of 34 specialists was attained equating to a 40% response rate. A similar distribution of gender was recorded for this sample (85.3% female) as for the consumer sample. However, over half (61.8%) of the specialists were aged between 15-34 likely due to the high percentage of masters and PhD respondents (38.2% of the sample). It was not possible to test for a relationship between gender and age due to the small sample size. All respondents had experience of working in animal welfare. 38.2% had experience with poultry but only 11.8% specifically with laying hens.

When asked to rate welfare on a 1-10 scale (where 10=best possible welfare), the specialist sample gave a mean score of 5.9 (±1.4, range: 2-8). In the specialist sample, the majority (41.2%) chose overall space allowance as the most important general welfare factor, giving access to the outside only 14.7% of votes. Access to trees was chosen as most important outside (38.2%). In contrast to the consumer sample, the least popular choices without any votes were fresh air and access to sunlight. See table I for full results. When asked to choose the most suitable resource inside, the specialists chose similarly to the consumer sample. Music, wind chimes, footballs and coloured cones were chosen by 0% whereas perches (44.1%), dustbaths (35.3%), straw bales (11.8%) and pecking blocks (8.8%) were all preferred. The most suitable resource outside as chosen by the specialists was shelter (67.6%). See table II for full results.

Consumer sample vs specialist sample

Specialists rated welfare of free-range hens significantly lower than consumers on a 1-10 scale. Consumers gave access to the outside and interaction with people a significantly higher importance rating than specialists. Specialists and consumers significantly differed in their importance rating of all outside factors. Specialists rated perches inside and dustbaths both inside and outside significantly higher than consumers. See table III (columns 3, 4 and 5) for a breakdown of all statistical tests performed.

Because the consumer group comprised respondents that were on average older than the specialists, the largest possible subsample of the consumer group, stratified to match the gender and age profile of the specialist sample, was randomly selected. The Mann-Whitney U test was then performed again comparing this subsample to the specialist sample. The subsample consisted of 1632 consumers that exactly matched the proportion of respondents in each age and gender group with that of the specialist

respondents. The results remained the same for all tests with only minor differences in significance level for some questions. Moreover, in three cases there was an in increase in significance from $p<0.05$ to $p<0.01$ whereas there were no reductions in significance from $p<0.01$ to $p<0.05$. This suggests that the significant effects seen when comparing to the full consumer sample were not due to the different demographic profile of the specialist sample.

Differences between demographic groups

When testing for differences between demographic groups we focussed on the questions of greatest applied relevance. These were the 1-10 scale rating of free-range hen welfare, and the most important general and outside factors.

Differences in responses between genders were first tested. Men (mean= 8.6, n=1185) rated the welfare of free-range hens as significantly lower than women (mean= 8.8, n=5193) on a 1-10 scale (Mann Whitney U= 2804102.5, Z=-4.962, $p<0.001$). When asked to select the most important factor, gender had a significant effect on the answer given for both general ($\chi^2(5)=14.797$, $p=0.011$) and outside factors ($\chi^2(5)=29.844$, $p<0.001$). For general factors men were less likely than women to choose overall space allowance and more likely to choose access to play equipment. Outside, men were less likely to choose fresh air and more likely to choose increased 'naturalness' and access to sunlight than women.

Non-buyers (mean=8.4, n=725) rated the welfare of free-range hens lower on a 1-10 scale than buyers (mean= 8.8, n=5653) (Mann Whitney U= 1788629.5, Z=-5.809, $p<0.001$). When asked to select the most important factor, buyer status had a significant effect on the answer given for both general ($\chi^2(5)=12.875$, $p=0.025$) and outside factors ($\chi^2(5)=14.733$, $p=0.012$). For general factors, non-buyers were more likely to choose veterinary care than buyers. Outside, non-buyers were less likely to choose access to trees or increased 'naturalness' than buyers.

Finally, differences in responses between age groups were tested. Score given for welfare on a 1-10 scale increased with age group (KW test: $\chi^2(3)=71.852$, $p<0.001$). Post-hoc pairwise comparisons indicated a significant effect between all groups except 35-44 and 45-54. When asked to select the most important factor, age had a significant effect on the answer given for both general ($\chi^2(25)=65.181$, $p<0.001$) and outside factors ($\chi^2(25)=69.359$, $p=0.005$). For general factors, respondents ages 15-34 were less likely to choose outside access and more likely to choose veterinary care. Overall space allowance was chosen more by 35-44 year olds and less by those 55+. Respondents aged 55+ were also more likely to choose outside access and less likely to choose play equipment. Outside, 15-34 year olds were more likely to choose fresh air and less likely to choose increased 'naturalness'. Conversely those aged 55+ were more likely to choose 'naturalness'. It should be noted that as gender and age were related these effects are likely linked.

Discussion

The main aim of this research was to establish what free-range egg consumers believe is important for the welfare of laying hens and how they consider welfare can be improved through provision of resources on farm.

The reasons selected for why people choose to buy free-range eggs are of great interest. The two answers chosen most often both related to the direct welfare of the animal, happiness and healthiness. This indicates that consumers from this sample value animal welfare highly when making purchasing choices of eggs. However, taste was a principal reason selected by over half of all respondents. Fearne and Lavelle (1996) also found that consumers believed free-range eggs to taste better, with many claiming that production methods and the diet of the bird have an effect on egg taste. Similarly, a survey carried out in the USA showed that almost 60% believed that food products produced in 'animal friendly' environment taste better (Heng et al., 2013). The idea of free-range being a more natural production method was also a popular choice. Consumers may define animal welfare in terms of natural lives and humane deaths (Harper and Henson, 2001) which could explain this leaning towards the concept of what is 'natural' despite the fact that commercial egg production is far from this.

The respondents chose 'cost' as the main reason why they choose to buy non-free-range eggs. Where respondents selected 'Other' they often claimed to buy non-free range for baking or where many eggs are needed. This may demonstrate a trade-off between cost and other factors such as welfare and taste – when only a few eggs are needed more people are happier to pay the premium. Such a link has been observed before (e.g. Bennett and Blaney, 2003).

Generally, respondents rated welfare of free-range hens high (mean 8.7/10), but the scale was subjective. It is possible that the use of the scale may have been different if respondents had been asked to rate other production systems on the same scale as they would have had to compare the systems. However, this question was useful to get a very general idea of consumer perception of free-range hen welfare. Free-range production is sold to the public as a higher welfare option so it is unsurprising that it seems to be rated well in this regard. That the specialist sample rated welfare so much lower (mean 5.9) and not a single participant from this sample gave a score over 8 is of interest. It suggests that experience and education with animal welfare and livestock systems results in a less positive view of commercial free-range. The individuals represented in the specialist sample are likely to better understand the welfare issues that exist in these systems and to have taken these into account when rating welfare. As specialists highly valued overall space allowance and access to trees and these are not always well provided on free-range farms this may be reflected in their lower overall welfare rating.

Asking consumers which of the factors they consider the most important provided more information than what the Likert scales did alone. For example, many respondents gave the highest possible score of 5 to the factor 'Access to perches'. However, when asked to choose the most important factor, less than 5% chose this. Respondents may have had a tendency to rate all factors highly through a belief that they must be important as they were chosen for this survey. By asking consumers to select the most important priorities could be established.

Consumers regarded access to the outside as the most important factor for hen welfare. Outside access is the defining difference between free-range and barn production and fits with the idyllic image of the countryside often adopted by consumers (Vanhonacker et al., 2010). However, less than 15% of the specialist sample chose this as the most important factor listed. This suggests that those with experience of animal welfare may realise that outside access will only improve welfare if managed correctly. Overall space allowance was deemed the most important factor by nearly a quarter of respondents and was the most popular choice for specialists. This is also a feature of free-range systems as access to the outside increases the daytime space allowance considerably. It is possible that some may have interpreted overall space allowance as inside space only however. Veterinary care was the only other factor chosen as the most important by a considerable percentage of respondents. That this was considered less important than the two mostly behaviour-related factors seen above suggests that free-range egg consumers value aspects of mental health over physical health care. As the definition provided to survey respondents referred to 'happiness' of the hens, this may have focused respondents towards more behavioural aspects.

Fresh air was deemed the most important factor of the outside area. The concept of 'fresh air' can be interpreted in two main ways. It may be considered in terms of air quality and the fact that this was chosen may indicate that consumers believe the indoor climate to be either poor or insufficient. However, humans will open a window for 'fresh air' despite an acceptable indoor climate so it may be that this concept is unique to being outside. Not a single participant from the specialist sample chose fresh air for this question, the most popular choice was instead access to trees. It is unsurprising that the specialist sample did not value the vague concept of fresh air over other more specific aspects and provisions of the range, better backed by scientific evidence. It suggests that the specialists believe the indoor climate to be sufficient or that they did not consider fresh air in these terms.

Providing removable resources on farm is a relatively easy way to improve hen welfare in a commercial setting. It is useful to understand whether consumer choice for resources matches what is currently understood to be beneficial (through research) as consumers may be more likely to buy a product if they believe it to be high welfare. If consumer choice does not match our knowledge there may be a need for public education in this area. Inside the shed, resources that relate directly to the scientifically established behavioural needs of foraging, dustbathing and perching (Weeks and Nicol,

2006) were not only deemed more important by the respondents than those that did not but were also more likely to be chosen as the most important resource. Marketing campaigns have previously focused on anthropomorphic 'toys' for chickens in an attempt to appeal to consumers but these results suggest that this consumer sample are capable of distinguishing which resources best relate to hen behaviour, shunning the 'fun' options. It should be mentioned that some 'fun' options may relate to behavioural needs in a less apparent way (footballs as a pecking device, for example). Nevertheless, this result indicates that attempting to appeal to consumers by advertising toys rather than resources such as perching and dustbaths is perhaps unnecessary.

Similarly, when choosing the most important resource outside the shed, 'shelter' was considered most important by the majority of respondents. As prey animals, hens are fearful of open spaces (Jones, 1996) and many studies have demonstrated the benefit of shelter, both natural and artificial, through increased range use (Nicol et al., 2003; Hegelund et al., 2005; Zeltner and Hirt, 2008). This importance of shelter seems to have translated to the consumer. However, respondents did not believe that 'access to trees' was particularly important. The use of trees as a form of shelter did not seem to have occurred to the majority of consumers in this sample, despite their common use as such commercially and popularity with the specialist sample.

Men not only rated welfare lower than women but were also more likely to be non-buyers of free-range eggs. Research has suggested that women show more concern for animal welfare than men and that they consider animal welfare as a more important product attribute (Vanhonacker et al., 2007). This would explain the difference in buying habits between the genders seen in this study. However, the same research reports that women evaluate current welfare states as more negative, the opposite from what is seen here. This difference may be explained by the fact that this survey asked only about free-range production, a system advertised as high welfare. The fact that the sample is biased towards a free-range egg consumer may also have affected this gender relationship. It should be noted that respondents were not asked whether they were the main purchaser for their household and this could have influenced the gender effect.

That non-buyers of free-range eggs rated the welfare of free-range hens lower, although not hugely surprising, indicates that this group may be making the choice to buy non-free range products based on a lack of belief that free-range hen welfare is actually better. Non-buyers were more likely to choose veterinary care. If they value this factor more than behavioural factors they may not see an advantage in free-range production as caged systems also provide good veterinary care. The fact that they were also less likely to consider tree access and 'naturalness' as most important supports this theory.

As this sample was pulled from a pool of consumers from a high-welfare brand of eggs it is not representative of the general population. The sample is biased towards free-range egg buyers who are

more likely to consider animal welfare in their purchasing decisions. Although many consumers reported buying free-range eggs only occasionally or never (non-buyers) they are still likely to have experienced the marketing material of this egg company. This may have skewed their perceptions differently from the general public and provided a level of education on the subject. It would therefore be valuable to perform this study with a more representative sample.

By repeating the survey with a small group of 'specialists' in animal welfare, whether consumer perception matched that of more knowledgeable people could be studied. Although both samples were in agreement in some areas such as the importance of space allowance and the suitability of resources both inside and outside, there were also some clear differences. Idyllic images of free-range perpetuated by the media may have resulted in access to the outside and the concept of fresh-air being valued more highly by consumers. Specialists chose more scientifically backed and less vague choices such as space allowance and tree access. Access to trees was perhaps the most notable difference between the two groups and it would be constructive to educate consumers about their value for hen welfare.

Conclusions

This study has provided some insights into the free-range egg purchaser's perception of hen welfare.

Consumers in this sample valued welfare when purchasing free-range eggs as well as taste. They believed that free-range systems provide a high standard of welfare to the hens. Although they recognised the importance of many factors, outside access and fresh air were considered most important for welfare. This reinforces the importance of offering free-range eggs to consumers. Consumers also appeared to recognise the importance of providing resources that enable the expression of scientifically established behavioural needs of hens and the value of shelter in the outdoor area.

Consumer opinion should be considered in order to encourage purchasing behaviour and this study shows that consumers who currently buy free-range brands may be more aware of behavioural needs than marketing companies realise. Provision of such resources may therefore appeal to the consumer as well as providing welfare benefits to the animals. Continued communication by public authorities and the private sector is important to educate consumers, ensuring that they have accurate knowledge of welfare standards and animal needs when making purchasing choices.

Future research should focus on expanding this work to other consumer groups as the preliminary comparisons between buyers and non-buyers and males and females performed in this study indicated potential differences in perception. Statistical techniques such as ordinal regression could be utilised

to determine the relative effect of multiple determinants such as age, gender, or buyer-status upon consumer opinion.

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Figure 1: The reasons selected by consumer respondents for buying free-range eggs. Multiple options could be selected.

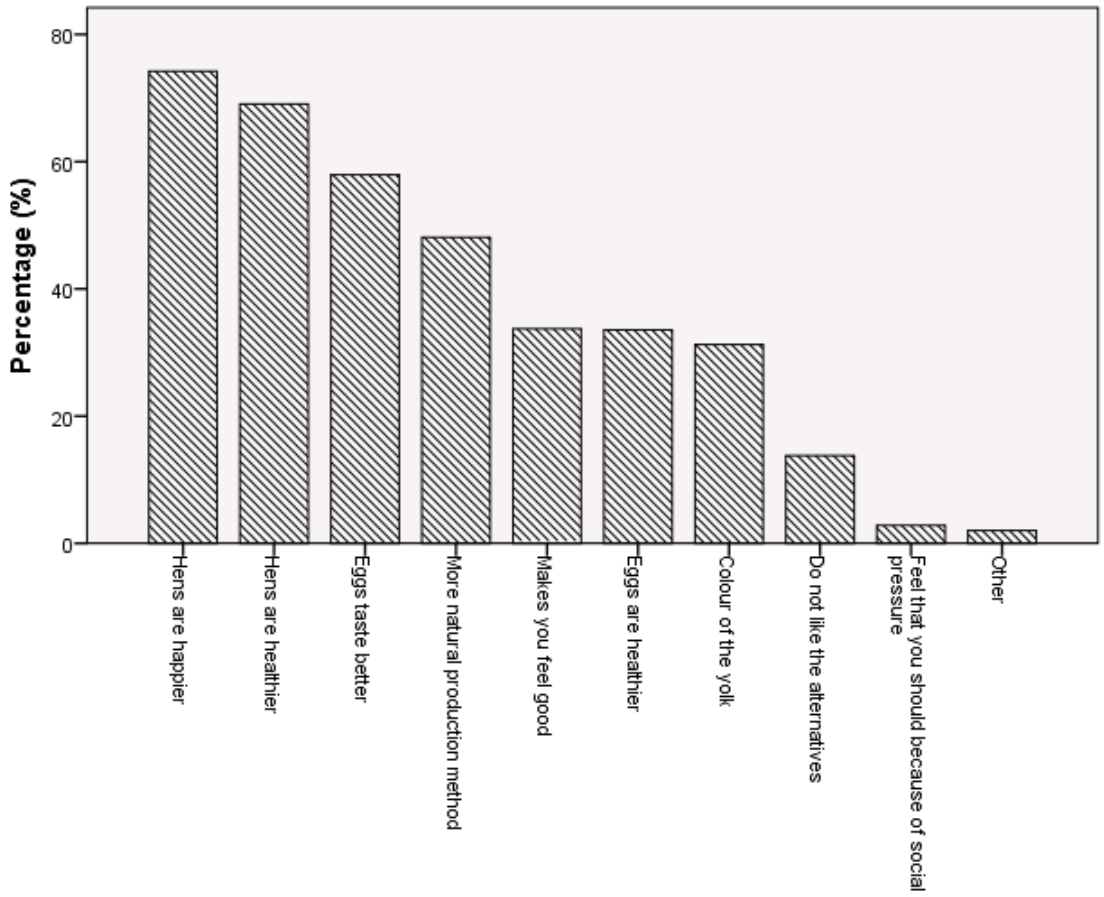

Figure 2: Consumer responses of the relative value of providing various resources for hens inside their housing.

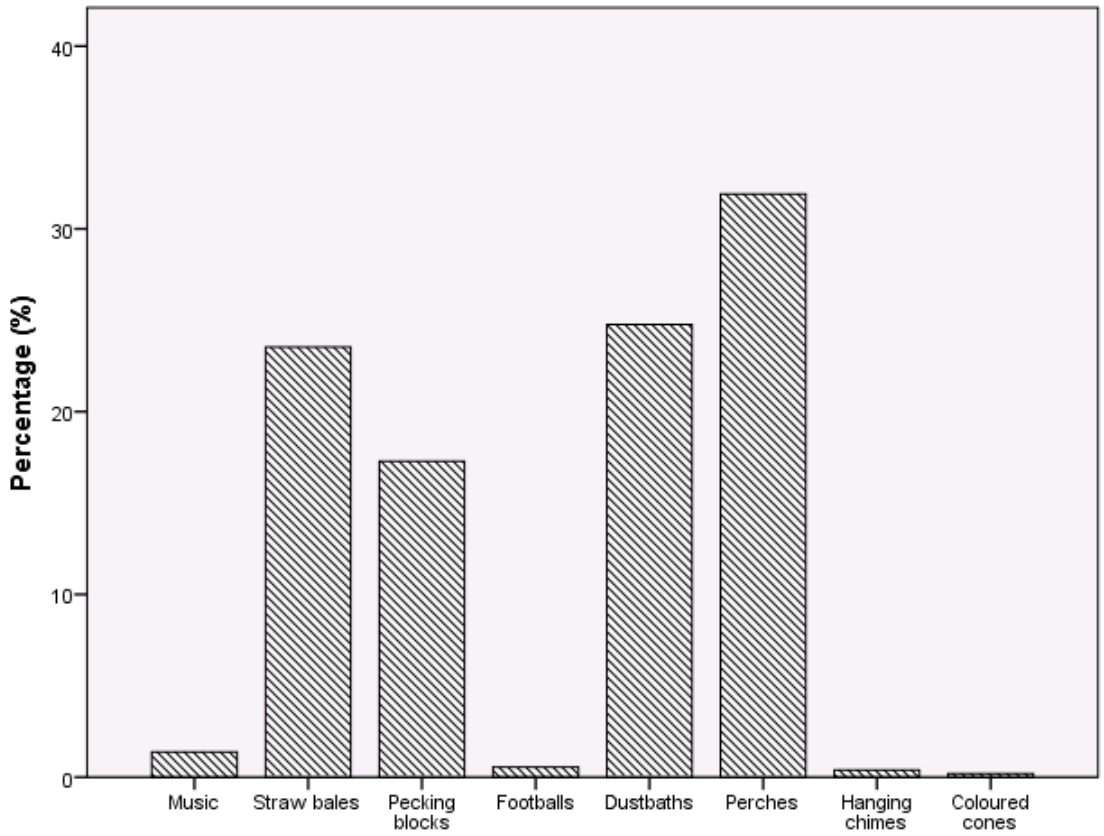

Table I: Percentages of responses for Likert scale based questions on importance of factors for hen welfare for both the full consumer sample and specialist sample (1=unimportant, 2=of little importance, 3=moderately important, 4=important, 5=very important).

	CONSUMER SAMPLE (n=6378)						**SPECIALIST SAMPLE (n=34)**					
	1	2	3	4	5	Chosen as most important (%)	1	2	3	4	5	Chosen as most important (%)
General Factors												
Access to perches	0.5	1.6	10.9	31.6	55.3	3.1	0.0	0.0	5.9	17.6	76.5	26.5
Access to outside	0.2	0.3	2.1	14.4	83.0	56.1	0.0	0.0	11.8	29.4	58.8	14.7
Vet care	0.2	0.3	3.4	17.9	78.2	15.0	0.0	0.0	5.9	23.5	70.6	14.7
Overall space allowance	0.1	0.3	2.4	18.7	78.5	24.5	0.0	0.0	5.9	20.6	73.5	41.2
Access to play equipment	1.8	7.1	21.4	29.7	40.0	0.6	0.0	11.8	26.5	26.5	35.3	0.0
Interaction with people	2.8	12.6	30.4	27.8	26.5	0.6	11.8	23.5	26.5	26.5	11.8	2.9
Factors of Outdoor Area												
Fresh air	0.2	0.1	3.1	18.7	77.9	30.5	0.0	5.9	26.5	35.3	32.4	0.0
Access to grass	0.1	0.9	5.7	22.8	70.5	16.6	0.0	5.9	17.6	35.3	41.2	14.7
Access to trees	1.5	9.1	24.5	27.9	37.0	1.4	0.0	5.9	5.9	14.7	73.5	38.2
Increased 'naturalness'	0.4	1.7	12.6	30.5	54.8	16.1	2.9	14.7	20.6	29.4	32.4	23.5
Access to sunlight	0.1	0.3	3.5	21.6	74.6	16.1	0.0	5.9	14.7	47.1	32.4	0.0
Extra space	0.1	0.3	3.3	20.3	76.0	19.3	0.0	2.9	8.8	41.2	47.1	23.5

Table II: Percentages of responses for Likert scale based questions on suitability of resources inside and outside of the hen house for both the full consumer sample and the specialist sample (1=unimportant, 2=of little importance, 3=moderately important, 4=important, 5=very important).

	CONSUMER SAMPLE (n=6378)						**SPECIALIST SAMPLE (n=34)**					
	1	2	3	4	5	Chosen as most suitable (%)	1	2	3	4	5	Chosen as most suitable (%)
Inside												
Music	11.5	37.3	29.0	15.7	6.6	1.4	11.8	58.8	11.8	14.7	2.9	0.0
Straw bales	0.4	2.0	14.4	36.2	47.0	23.5	0.0	2.9	8.8	26.5	61.8	11.8
Pecking blocks	0.9	1.8	10.1	34.5	52.7	17.3	0.0	0.0	8.8	35.3	55.9	8.8
Footballs	23.4	35.6	22.0	12.4	6.6	0.5	17.6	26.5	35.3	20.6	0.0	0.0
Dustbaths	2.8	5.0	16.4	28.4	47.4	24.8	0.0	2.9	0.0	14.7	82.4	35.3
Perches	0.7	1.6	7.9	26.5	63.3	31.9	0.0	0.0	5.9	8.8	85.3	44.1
Hanging chimes	18.8	36.5	24.4	13.4	6.9	0.4	14.7	50.0	14.7	17.6	2.9	0.0
Coloured cones	20.0	38.2	24.4	11.6	5.7	0.2	17.6	44.1	23.5	11.8	2.9	0.0
Outside												
Dustbaths	1.1	2.4	10.9	27.1	58.5	15.2	0.0	0.0	5.9	11.8	82.4	14.7
Perches	0.4	1.6	8.9	30.0	59.0	15.6	0.0	2.9	14.7	26.5	55.9	5.9
Wildflowers	2.4	11.7	24.7	29.8	31.4	3.6	2.9	29.4	23.5	26.5	17.6	2.9
Fallen tree branches	3.6	8.7	21.9	31.4	34.3	3.0	0.0	5.9	5.9	41.2	47.1	8.8
Shelter	0.2	0.4	3.3	17.2	79.0	62.6	0.0	0.0	2.9	2.9	94.1	67.6

Table III: Comparison of the specialist scores for the scale-based questions with the scores of all consumers and a sub-sample of these consumers (matched for gender and age with the specialist sample) using Mann Whitney U tests (*=p<0.05, **=p<0.01).

QUESTION	OPTION	SPECIALISTS (n=34)		CONSUMER - full sample (n=6378)		U VALUE	CONSUMER – subsample (n=1632)		U VALUE
		MEAN	SD	MEAN	SD		MEAN	SD	
Rating the welfare of free-range hens.	N/A	5.94	1.434	8.72	1.29	14775**	8.58	1.403	4686**
Importance of factors affecting welfare (general)	Access to perches	4.71	0.579	4.4	0.784	84914*	4.34	0.838	20981**
	Access to outside	4.47	0.706	4.8	0.496	81263**	4.76	0.563	21439**
	Vet care	4.65	0.597	4.74	0.55	100028	4.71	0.585	25988
	Overall space allowance	4.68	0.589	4.75	0.518	102555	4.73	0.546	26593
	Access to play equipment	3.85	1.048	3.99	1.029	99744	4.05	1.005	24663.5
	Interaction with people	3.03	1.218	3.63	1.086	78861**	3.63	1.084	20165**
Importance of factors affecting welfare (outdoors)	Fresh air	3.94	0.919	4.74	0.53	53653**	4.74	0.538	13792.5**
	Access to grass	4.12	0.913	4.63	0.647	73268**	4.62	0.663	18836**
	Access to trees	4.56	0.86	3.9	1.052	67557**	3.93	1.043	17710**
	Increased ‘naturalness’	3.74	1.163	4.37	0.799	74272**	4.36	0.821	19193.5**
	Access to sunlight	4.06	0.851	4.7	0.548	59591**	4.69	0.574	15413**
	Extra space	4.32	0.768	4.72	0.549	76077**	4.67	0.609	20281.5**
Suitability of resources (indoors)	Music	2.38	0.985	2.69	1.074	89433	2.6	1.12	24537
	Straw bales	4.47	0.788	4.27	0.809	92415	4.25	0.835	23309
	Pecking blocks	4.47	0.662	4.36	0.806	103094	4.32	0.847	25693
	Footballs	2.59	1.019	2.43	1.166	96317	2.49	1.217	25403.5
	Dustbaths	4.76	0.606	4.13	1.036	68008**	4.04	1.071	16147**
	Perches	4.79	0.538	4.5	0.767	85109*	4.44	0.816	20797.5**
	Hanging chimes	2.44	1.05	2.53	1.145	103904	2.64	1.218	25273
	Coloured cones	2.38	1.015	2.45	1.105	106022	2.52	1.174	26322.5
Suitability of resources (outdoors)	Dustbaths	4.76	0.554	4.39	0.854	82180**	4.33	0.89	20066**
	Perches	4.35	0.849	4.46	0.759	102504	4.43	0.769	26609.5
	Wildflowers	3.26	1.163	3.76	1.09	81924*	3.85	1.107	19827**
	Fallen tree branches	4.29	0.836	3.84	1.101	83732*	3.80	1.168	21436*
	Shelter	4.91	0.379	4.74	0.55	92430*	4.69	0.607	22630*